

Zero Volatile Organic Compound Topcoat Testing

Background:

The Federal Clean Air Act Amendments (CAA) strictly limits the amount of volatile organic compounds (VOC) in a coating formulation to 340 grams per liter (g/L) (2.8 lbs/gal) for primers and 420 g/L (3.5 lbs/gal) for topcoats. Additionally some states (and even counties within a given state) have imposed more stringent standards far exceeding the federal limits. If the past regulatory environment is an accurate indicator of future trends, Federal regulations will tend towards decreasing allowable VOCs.

As the allowable VOC emissions are decreased, federal regulation compliance can be gained through 1) implementation of control or recovery devices or 2) through use of compliant coatings. At first observation, the installation of control/recovery devices would seem the better solution requiring a one-time investment without requiring a coating formulation change. A formulation change may result in decreased performance and increased cost. With regulations driving VOC allowable limits toward zero, attempts at the control/recovery approach nears the impossible. Also, as important as reducing the allowable emissions to the environment is the trend to decrease the disposal of many chemicals and reduce worker exposure. With the many restrictions governing the chemical composition of a coating formulation, the need for reformulation is inevitable.

As these regulations become more stringent, it is imperative that development and implementation activities be focused as much as possible with both current as well as anticipated environmental regulations in mind. In terms of designing a top coat formulation to meet current and anticipated environmental regulations, the logical approach was to consider the current allowable level being 420 g/L as dictated by the Clean Air Act Aerospace National Emission Standards for Hazardous Air Pollutants (NESHAP) and a probable future level being 0 g/L. Developing a formulation to meet this potential requirement should be accomplished as quickly as possible so that reformulation and re-qualification of a new material a few years down the road will not be required. As a result, Deft® has developed a Zero VOC topcoat to satisfy these strict limits. This project will evaluate the Zero VOC topcoat.

Project Sponsor/Customer: USAF Air Logistics Centers; Otis ANG Base
Period of Performance: Apr 00 – Sep 01

Objectives:

This project evaluates new “0” VOC topcoat formulations against the military specification MIL-PRF-85285. A battery of testing will be accomplished including: moisture, corrosion, fluid resistance, and dry film properties. The “0” VOC topcoat will be applied over MIL-P-23377G, TT-P-2760, PR-1432 GV and many other waterborne primers for compatibility testing to determine its possibilities as a complete coating system. These coating stack-ups are applied at a variety of environmental conditions.

The CTIO will test the Deft® Zero VOC topcoat to:

- Compare the performance of the topcoat to constraints set forth in MIL-PRF-85285, the military specification for polyurethane coating
- Determine an optimal primer coating system for the Deft® Zero VOC topcoat
- Investigate and validate the most favorable environmental conditions for application
- Investigate which accepted stripping technologies are best suited for removal of the Deft® Zero VOC topcoat

Status:

Phase 1 of the project is approximately 80% complete. Phase 1 data suggests a significant lack of performance of the materials. Phase 2 planning is on hold until some of Phase 1 testing is repeated with a new batch of material and cross tested with panels prepared by Deft.

Project Plan: Approved Jul 00

Test Plan: Three test plans will be developed. To date one is approved

Final Report: Planned completion Sep 01

As of Date: Feb 01